

SEQUENCE LISTING

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Yu, Xu-Jie

<120> *Ehrlichia chaffeensis* 28 kDa Outer Membrane
Protein Multigene Family

<130> D6311

<141> 2001-05-01

<150> 60/201,035

<151> 2000-05-01

<160> 53

<210> 1

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<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-1 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 1

Met Ser Lys Arg Ser Asn Arg Lys Phe Val Leu Trp Val Met Leu
5 10 15

Ile Leu Phe Thr Pro His Ile Ser Leu Ala Ser Val Leu Asn Asp
20 25 30

His Asn Ser Met Tyr Val Gly Ile Gln Tyr Lys Pro Ala Arg Gln
35 40 45

His Leu Ser Lys Leu Leu Ile Lys Glu Ser Ala Ala Asn Thr Val
50 55 60

Glu Val Phe Gly Leu Lys Lys Asp Leu Leu Asn Asp Leu Leu Thr
65 70 75

Gly Ile Lys Asp Asn Thr Asn Phe Asn Ile Lys Tyr Asn Pro Tyr
80 85 90

Tyr Glu Asn Asn Arg Leu Gly Phe Ser Gly Ile Phe Gly Tyr Tyr
95 100 105

Tyr Asn Lys Asn Phe Arg Ile Glu Ser Glu Leu Ser Tyr Glu Thr
110 115 120

Phe His Ile Lys Asn Asn Gly Tyr Lys Arg Ile Asp Cys Glu Lys
125 130 135

His Phe Ala Leu Ala Lys Glu Ile Ser Gly Gly Ser Asn Asn Pro
140 145 150

Ala Asn Asn Lys Tyr Val Thr Leu Ile Asn Asn Gly Ile Ser Leu
155 160 165

Thr Ser Ala Leu Ile Asn Val Cys Tyr Asp Val Asp Gly Leu Lys
170 175 180

His Asn Ile Ile Thr Tyr Ser Cys Leu Gly Phe Gly Val Asp Thr
185 190 195

Ile Asp Phe Leu Ser Lys Tyr Thr Thr Lys Phe Ser Tyr Gln Gly
200 205 210

Lys Leu Gly Ala Ser Tyr Thr Val Ser Pro Gln Val Ser Val Phe
215 220 225

Ile Glu Gly Tyr Tyr His Gly Leu Phe Gly Lys Lys Phe Glu Lys
230 235 240

Ile Pro Val Asn Tyr Pro Cys Asp Tyr Pro Ser Pro Thr Pro Pro
245 250 255

Asn Ser Lys Pro His Val His Thr Thr Ala Leu Ala Met Leu Ser
260 265 270

Ile Gly Tyr Tyr Gly Gly Ser Ile Gly Ile Lys Phe Ile Leu
275 280

<210> 2

<211> 297

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-2 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 2

Met Ser Tyr Ala Lys Val Phe Ile Leu Ile Cys Leu Ile Leu Leu
5 10 15

Val Pro Ser Leu Ser Phe Ala Ile Val Asn Asn Asp Phe Leu Lys
20 25 30

Asp Asn Ile Gly His Phe Tyr Ile Gly Gly Gln Tyr Lys Pro Gly
35 40 45

Val Pro Arg Phe Asn Arg Phe Leu Val Thr Asn Asn Asn Ile Arg
50 55 60

Glu Leu Met Ser Ser Asp Glu Glu Cys Arg Ser Thr Ile Pro His
65 70 75

Met Val Gln Ser Val Ala Gln Gly Thr Leu Pro Pro Glu Ala Leu
80 85 90

Glu Glu Leu Ala Asp Gly Lys Phe Pro Glu Gly Tyr Leu Tyr Phe
95 100 105

Thr Ile Pro Tyr Asn Pro Thr Tyr Lys Lys Asn Leu Leu Gly Ala
110 115 120

Gly Gly Val Ile Gly Tyr Ser Thr Thr His Phe Arg Val Glu Val
125 130 135

Glu Ala Phe Tyr Asp Lys Phe Asn Leu Thr Ala Pro Ala Gly Tyr
140 145 150

Leu His Lys Asn Phe Tyr Glu Tyr Phe Ala Leu Ala Thr Thr Met
155 160 165

Asp Thr Lys His Pro His Gln Ser Ala Glu Asp Lys Tyr Tyr Tyr
170 175 180

Met Lys Asn Thr Gly Ile Thr Leu Ser Pro Phe Ile Ile Asn Ala
185 190 195

Cys Tyr Asp Phe Ile Leu Lys Lys Thr Arg Asn Val Ala Pro Tyr
200 205 210

Leu Cys Leu Gly Val Gly Gly Asn Phe Ile Asp Phe Leu Asp Gln
215 220 225

Val Ser Phe Lys Phe Ala Tyr Gln Ala Lys Val Gly Ile Ser Tyr
230 235 240

Phe Val Ser Pro Asn Ile Ala Phe Phe Ile Asp Gly Ser Phe His
245 250 255

Gly His Leu Asn Asn Gln Phe Ser Asp Ser Pro Val Val Asp Tyr
260 265 270

Ser Ser Ser Gly Phe Pro Thr Ile Ser Ala Lys Phe Asn Ala Asn
275 280 285

Phe Leu Thr Ser Ser Ile Gly Ile Arg Phe Ile Ser
290 295

<210> 3
<211> 285
<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-3 Outer Membrane Protein of
Ehrlichia chaffeensis

<400>	3			
Met Gln Lys Leu Tyr Ile Ser Phe Ile Ile	Leu Ser Gly Leu Leu	5	10	15
Leu Pro Lys Tyr Val Phe Cys Met His Gln Asn Asn Asn Ile Asp		20	25	30
Gly Ser Tyr Val Thr Ile Lys Tyr Gln Leu Thr Thr Pro His Phe		35	40	45
Lys Asn Phe Tyr Ile Lys Glu Thr Asp Phe Asp Thr Gln Glu Pro		50	55	60
Ile Gly Leu Ala Lys Ile Thr Ala Asn Thr Lys Phe Asp Thr Leu		65	70	75
Lys Glu Asn Phe Ser Phe Ser Pro Leu His Gln Thr Asp Ser Tyr		80	85	90
Lys Ser Tyr Gln Asn Asp Leu Leu Gly Ile Gly Leu Ser Val Gly		95	100	105
Leu Phe Val Lys Ser Phe Arg Ile Glu Phe Glu Gly Ala Tyr Lys		110	115	120
Asn Phe Asn Thr Lys Arg Leu Ala Arg Tyr Lys Ser Lys Asp Gly		125	130	135
Tyr Lys Tyr Phe Ala Ile Pro Arg Lys Ser Glu His Gly Phe Leu		140	145	150
Asp Asn Thr Phe Gly Tyr Thr Val Ala Lys Asn Asn Gly Ile Ser		155	160	165
Ile Ile Ser Asn Ile Ile Asn Leu Cys Ser Glu Thr Lys Tyr Lys		170	175	180

Ser Phe Thr Pro Tyr Ile Cys Ile Gly Val Gly Gly Asp Phe Ile
185 190 195

Glu Ile Phe Asp Val Met Arg Ile Lys Phe Ala Tyr Gln Gly Lys
200 205 210

Val Gly Val Ser Tyr Pro Ile Thr Ser Lys Leu Ile Leu Ser Ile
215 220 225

Asn Gly Gln Tyr His Lys Val Ile Gly Asn Lys Phe Glu Leu Leu
230 235 240

Pro Val Tyr Gln Pro Val Glu Leu Lys Arg Leu Val Thr Asn Lys
245 250 255

Thr Ser Lys Asp Ile Asp Gln Asp Val Thr Ala Ser Leu Thr Leu
260 265 270

Asn Leu Glu His Phe Ser Ser Glu Ile Gly Leu Ser Phe Ile Phe
275 280 285

<210> 4

<211> 272

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-4 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 4

Met Tyr Met Tyr Asn Lys Lys His Tyr Cys Tyr Ile Val Thr Tyr
5 10 15

Val Ile Thr Leu Phe Phe Leu Leu Leu Pro Ile Glu Ser Leu Ser
20 25 30

Ala Leu Ile Gly Asn Val Glu Lys Asp Leu Lys Val Ser Ser Thr
35 40 45

Tyr Val Ser Ser Gln Tyr Lys Pro Ser Ile Phe His Phe Arg Asn
50 55 60

Phe Ser Ile Gln Glu Ser His Pro Lys Lys Ser Ser Glu Glu Phe
65 70 75

Lys Lys Ile Lys Ala Asn Leu Asn Asn Ile Leu Lys Ser Asn Ala
80 85 90

Tyr Asn Leu Gln Phe Gln Asp Asn Thr Thr Ser Phe Ser Gly Thr
95 100 105

Ile Gly Tyr Phe Ser Lys Gly Leu Arg Leu Glu Ala Glu Gly Cys
110 115 120

Tyr Gln Glu Phe Asn Val Lys Asn Ser Asn Asn Ser Leu Ile Ile
125 130 135

Ser Ser Asn Lys Tyr His Ser Arg Ile His Asp Glu Asn Tyr Ala
140 145 150

Ile Thr Thr Asn Asn Lys Leu Ser Ile Ala Ser Ile Met Val Asn
155 160 165

Thr Cys Tyr Asp Ile Ser Ile Asn Asn Thr Ser Ile Val Pro Tyr
170 175 180

Leu Cys Thr Gly Ile Gly Glu Asp Leu Val Gly Leu Phe Asn Thr
185 190 195

Ile His Phe Lys Leu Ala Tyr Gln Gly Lys Val Gly Met Ser Tyr
200 205 210

Leu Ile Asn Asn Asn Ile Leu Leu Phe Ser Asp Ile Tyr Tyr His
215 220 225

Lys Val Met Gly Asn Arg Phe Lys Asn Leu Tyr Met Gln Tyr Val
230 235 240

Ala Asp Pro Asn Ile Ser Glu Glu Thr Ile Pro Ile Leu Ala Lys
245 250 255

Leu Asp Ile Gly Tyr Phe Gly Ser Glu Ile Gly Ile Arg Phe Met
260 265 270

Phe Asn

<210> 5
<211> 295
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-5 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 5

Met	Thr	Lys	Lys	Phe	Asn	Phe	Val	Asn	Val	Ile	Leu	Thr	Phe	Leu	
										5	10				15
Leu	Phe	Leu	Phe	Pro	Leu	Lys	Ser	Phe	Thr	Thr	Tyr	Ala	Asn	Asn	
									20	25				30	
Asn	Thr	Ile	Thr	Gln	Lys	Val	Gly	Leu	Tyr	Ile	Ser	Gly	Gln	Tyr	
									35	40				45	
Lys	Pro	Ser	Ile	Pro	His	Phe	Lys	Asn	Phe	Ser	Val	Glu	Glu	Asn	
									50	55				60	
Asp	Lys	Val	Val	Asp	Leu	Ile	Gly	Leu	Thr	Thr	Asp	Val	Thr	Tyr	
									65	70				75	
Ile	Thr	Glu	His	Ile	Leu	Arg	Asp	Asn	Thr	Lys	Phe	Asn	Thr	His	
									80	85				90	
Tyr	Ile	Ala	Lys	Phe	Lys	Asn	Asn	Phe	Ile	Asn	Phe	Ser	Ser	Ala	
									95	100				105	
Ile	Gly	Tyr	Tyr	Ser	Gly	Gln	Gly	Pro	Arg	Leu	Glu	Ile	Glu	Ser	
									110	115				120	
Ser	Tyr	Gly	Asp	Phe	Asp	Val	Val	Asn	Tyr	Lys	Asn	Tyr	Ala	Val	
									125	130				135	

Gln Asp Val Asn Arg Tyr Phe Ala Leu Val Arg Glu Lys Asn Gly
140 145 150

Ser Asn Phe Ser Pro Lys Pro His Glu Thr Ser Gln Pro Ser Asp
155 160 165

Ser Asn Pro Lys Lys Ser Phe Tyr Thr Leu Met Lys Asn Asn Gly
170 175 180

Val Phe Val Ala Ser Val Ile Ile Asn Gly Cys Tyr Asp Phe Ser
185 190 195

Phe Asn Asn Thr Thr Ile Ser Pro Tyr Val Cys Ile Gly Val Gly
200 205 210

Gly Asp Phe Ile Glu Phe Phe Glu Val Met His Ile Lys Phe Ala
215 220 225

Cys Gln Ser Lys Val Gly Ile Ser Tyr Pro Ile Ser Pro Ser Ile
230 235 240

Thr Ile Phe Ala Asp Ala His Tyr His Lys Val Ile Asn Asn Lys
245 250 255

Phe Asn Asn Leu His Val Lys Tyr Ser Tyr Glu Leu Lys Asn Ser
260 265 270

Pro Thr Ile Thr Ser Ala Thr Ala Lys Leu Asn Ile Glu Tyr Phe
275 280 285

Gly Gly Glu Val Gly Met Arg Phe Ile Phe
290 295

<210> 6
<211> 279
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-6 Outer Membrane Protein of

Ehrlichia chaffeensis

<400>	6
Met Ser Lys Lys Phe Ile Thr Ile Gly Thr Val Leu Ala Ser	
5	10
Leu Leu Ser Phe Leu Ser Ile Glu Ser Phe Ser Ala Ile Asn His	
20	25
Asn His Thr Gly Asn Asn Thr Ser Gly Ile Tyr Ile Thr Gly Gln	
35	40
Tyr Arg Pro Gly Val Ser His Phe Ser Asn Phe Ser Val Lys Glu	
50	55
Thr Asn Val Asp Thr Ile Gln Leu Val Gly Tyr Lys Lys Ser Ala	
65	70
Ser Ser Ile Asp Pro Asn Thr Tyr Ser Asn Phe Gln Gly Pro Tyr	
80	85
90	
Thr Val Thr Phe Gln Asp Asn Ala Ala Ser Phe Ser Gly Ala Ile	
95	100
105	
Gly Tyr Ser Tyr Pro Glu Ser Leu Arg Leu Glu Leu Glu Gly Ser	
110	115
120	
Tyr Glu Lys Phe Asp Val Lys Asp Pro Lys Asp Tyr Ser Ala Lys	
125	130
135	
Asp Ala Phe Arg Phe Phe Ala Leu Ala Arg Asn Thr Ser Thr Thr	
140	145
150	
Val Pro Asp Ala Gln Lys Tyr Thr Val Met Lys Asn Asn Gly Leu	
155	160
165	
Ser Val Ala Ser Ile Met Ile Asn Gly Cys Tyr Asp Leu Ser Phe	
170	175
180	
Asn Asn Leu Val Val Ser Pro Tyr Ile Cys Ala Gly Ile Gly Glu	
185	190
195	
Asp Phe Ile Glu Phe Phe Asp Thr Leu His Ile Lys Leu Ala Tyr	
200	205
210	

Gln Gly Lys Leu Gly Ile Ser Tyr Tyr Phe Phe Pro Lys Ile Asn
215 220 225

Val Phe Ala Gly Gly Tyr Tyr His Arg Val Ile Gly Asn Lys Phe
230 235 240

Lys Asn Leu Asn Val Asn His Val Val Thr Pro Asp Glu Phe Pro
245 250 255

Lys Ala Thr Ser Ala Val Ala Thr Leu Asn Val Ala Tyr Phe Gly
260 265 270

Gly Glu Ala Gly Val Lys Phe Thr Phe
275

<210> 7
<211> 283
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-7 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 7
Met Ser Ala Lys Lys Lys Leu Phe Ile Ile Gly Ser Val Leu Val
5 10 15

Cys Leu Val Ser Tyr Leu Pro Thr Lys Ser Leu Ser Asn Leu Asn
20 25 30

Asn Ile Asn Asn Asn Thr Lys Cys Thr Gly Leu Tyr Val Ser Gly
35 40 45

Gln Tyr Lys Pro Thr Val Ser His Phe Ser Asn Phe Ser Leu Lys
50 55 60

Glu Thr Tyr Thr Asp Thr Lys Glu Leu Leu Gly Leu Ala Lys Asp
65 70 75

Ile Lys Ser Ile Thr Asp Ile Thr Thr Asn Lys Lys Phe Asn Ile
80 85 90

Pro Tyr Asn Thr Lys Phe Gln Asp Asn Ala Val Ser Phe Ser Ala
95 100 105

Ala Val Gly Tyr Ile Ser Gln Asp Ser Pro Arg Val Glu Val Glu
110 115 120

Trp Ser Tyr Glu Glu Phe Asp Val Lys Asn Pro Gly Asn Tyr Val
125 130 135

Val Ser Glu Ala Phe Arg Tyr Ile Ala Leu Ala Arg Gly Ile Asp
140 145 150

Asn Leu Gln Lys Tyr Pro Glu Thr Asn Lys Tyr Val Val Ile Lys
155 160 165

Asn Asn Gly Leu Ser Val Ala Ser Ile Ile Ile Asn Gly Cys Tyr
170 175 180

Asp Phe Ser Leu Asn Asn Leu Lys Val Ser Pro Tyr Ile Cys Val
185 190 195

Gly Phe Gly Gly Asp Ile Ile Glu Phe Phe Ser Ala Val Ser Phe
200 205 210

Lys Phe Ala Tyr Gln Gly Lys Val Gly Ile Ser Tyr Pro Leu Phe
215 220 225

Ser Asn Met Ile Ile Phe Ala Asp Gly Tyr Tyr His Lys Val Ile
230 235 240

Gly Asn Lys Phe Asn Asn Leu Asn Val Gln His Val Val Ser Leu
245 250 255

Asn Ser His Pro Lys Ser Thr Phe Ala Val Ala Thr Leu Asn Val
260 265 270

Glu Tyr Phe Gly Ser Glu Phe Gly Leu Lys Phe Ile Phe
275 280

<210> 8
<211> 275
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-8 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 8
Met Ser Lys Lys Asn Phe Ile Thr Ile Gly Ala Thr Leu Ile His
5 10 15
Met Leu Leu Pro Asn Ile Ser Phe Pro Glu Thr Ile Asn Asn Asn
20 25 30
Thr Asp Lys Leu Ser Gly Leu Tyr Ile Ser Gly Gln Tyr Lys Pro
35 40 45
Gly Ile Ser His Phe Ser Lys Phe Ser Val Lys Glu Ile Tyr Asn
50 55 60
Asp Asn Ile Gln Leu Ile Gly Leu Arg His Asn Ala Ile Ser Thr
65 70 75
Ser Thr Leu Asn Ile Asn Thr Asp Phe Asn Ile Pro Tyr Lys Val
80 85 90
Thr Phe Gln Asn Asn Ile Thr Ser Phe Ser Gly Ala Ile Gly Tyr
95 100 105
Ser Asp Pro Thr Gly Ala Arg Phe Glu Leu Glu Gly Ser Tyr Glu
110 115 120
Glu Phe Asp Val Thr Asp Pro Gly Asp Cys Leu Ile Lys Asp Thr
125 130 135
Tyr Arg Tyr Phe Ala Leu Ala Arg Asn Pro Ser Gly Ser Ser Pro
140 145 150

Thr Ser Asn Asn Tyr Thr Val Met Arg Asn Asp Gly Val Ser Ile
155 160 165

Thr Ser Val Ile Phe Asn Gly Cys Tyr Asp Ile Phe Leu Lys Asp
170 175 180

Leu Glu Val Ser Pro Tyr Val Cys Val Gly Val Gly Gly Asp Phe
185 190 195

Ile Glu Phe Phe Asp Ala Leu His Ile Lys Leu Ala Tyr Gln Gly
200 205 210

Lys Leu Gly Ile Asn Tyr His Leu Ser Thr Gln Ala Ser Val Phe
215 220 225

Ile Asp Gly Tyr Tyr His Lys Val Ile Gly Asn Gln Phe Asn Asn
230 235 240

Leu Asn Val Gln His Val Ala Ser Thr Asp Phe Gly Pro Val Tyr
245 250 255

Ala Val Ala Thr Leu Asn Ile Gly Tyr Phe Gly Gly Glu Ile Gly
260 265 270

Ile Arg Leu Thr Phe
275

<210> 9

<211> 285

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-9 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 9

Met Asn Asn Arg Lys Ser Phe Phe Ile Ile Gly Ala Ser Leu Leu
5 10 15

Ala Ser Leu Leu Phe Thr Ser Glu Ala Ser Ser Thr Gly Asn Val
20 25 30

Ser Asn His Thr Tyr Phe Lys Pro Arg Leu Tyr Ile Ser Gly Gln
35 40 45

Tyr Arg Pro Gly Val Ser His Phe Ser Lys Phe Ser Val Lys Glu
50 55 60

Thr Asn Tyr Asn Thr Thr Gln Leu Val Gly Leu Lys Lys Asp Ile
65 70 75

Ser Val Ile Gly Asn Ser Asn Ile Thr Thr Tyr Thr Asn Phe Asn
80 85 90

Phe Pro Tyr Ile Ala Glu Phe Gln Asn Asn Ala Ile Ser Phe Ser
95 100 105

Gly Ala Ile Gly Tyr Leu Tyr Ser Glu Asn Phe Arg Ile Glu Val
110 115 120

Glu Ala Ser Tyr Glu Glu Phe Asp Val Lys Asn Pro Glu Gly Ser
125 130 135

Ala Thr Asp Ala Tyr Arg Tyr Phe Ala Leu Ala Arg Ala Met Asp
140 145 150

Gly Thr Asn Lys Ser Ser Pro Asp Asp Thr Arg Lys Phe Thr Val
155 160 165

Met Arg Asn Asp Gly Leu Ser Ile Ser Ser Val Met Ile Asn Gly
170 175 180

Cys Tyr Asn Phe Thr Leu Asp Asp Ile Pro Val Val Pro Tyr Val
185 190 195

Cys Ala Gly Ile Gly Gly Asp Phe Ile Glu Phe Phe Asn Asp Leu
200 205 210

His Val Lys Phe Ala His Gln Gly Lys Val Gly Ile Ser Tyr Ser
215 220 225

Ile Ser Pro Glu Val Ser Leu Phe Leu Asn Gly Tyr Tyr His Lys
230 235 240

Val Thr Gly Asn Arg Phe Lys Asn Leu His Val Gln His Val Ser
245 250 255

Asp Leu Ser Asp Ala Pro Lys Phe Thr Ser Ala Val Ala Thr Leu
260 265 270

Asn Val Gly Tyr Phe Gly Gly Glu Ile Gly Val Arg Phe Ile Phe
275 280 285

<210> 10

<211> 291

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-10 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 10

Met Asn Lys Lys Asn Lys Phe Ile Ile Ala Thr Ala Leu Val Tyr
5 10 15

Leu Leu Ser Leu Pro Ser Val Ser Phe Ser Glu Val Thr Asn Ser
20 25 30

Ser Ile Lys Lys His Ser Gly Leu Tyr Ile Ser Gly Gln Tyr Lys
35 40 45

Pro Ser Val Ser Val Phe Ser Ser Phe Ser Ile Lys Glu Thr Asn
50 55 60

Thr Ile Thr Lys Ile Leu Ile Ala Leu Lys Lys Asp Ile Asn Ser
65 70 75

Leu Glu Val Asn Ala Asp Ala Ser Gln Gly Ile Ser His Pro Gly
80 85 90

Asn Phe Thr Ile Pro Tyr Ile Ala Ala Phe Glu Asp Asn Ala Phe
95 100 105

Asn Phe Asn Gly Ala Ile Gly Tyr Ile Thr Glu Gly Leu Arg Ile
110 115 120

Glu Ile Glu Gly Ser Tyr Glu Glu Phe Asp Ala Lys Asn Pro Gly
125 130 135

Gly Tyr Gly Leu Asn Asp Ala Phe Arg Tyr Phe Ala Leu Ala Arg
140 145 150

Asp Met Glu Ser Asn Lys Phe Gln Pro Lys Ala Gln Ser Ser Gln
155 160 165

Lys Val Phe His Thr Val Met Lys Ser Asp Gly Leu Ser Ile Ile
170 175 180

Ser Ile Met Gly Asn Gly Trp Tyr Asp Phe Ser Ser Asp Asn Leu
185 190 195

Leu Val Ser Pro Tyr Ile Cys Gly Gly Ile Gly Val Asp Ala Ile
200 205 210

Glu Phe Phe Asp Ala Leu His Ile Lys Leu Ala Cys Pro Ser Lys
215 220 225

Leu Gly Ile Thr Tyr Gln Leu Ser Tyr Asn Ile Ser Leu Phe Ala
230 235 240

Val Gly Phe Tyr His Gln Val Ile Gly Asn Gln Phe Arg Asn Leu
245 250 255

Asn Val Gln His Val Ala Glu Leu Asn Asp Ala Pro Lys Val Thr
260 265 270

Ser Ala Val Ala Thr Leu Asn Val Gly Tyr Phe Gly Ala Glu Val
275 280 285

Gly Val Arg Phe Ile Phe
290

<210> 11
<211> 298
<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-11 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 11

Met Asn His Lys Ser Met Leu Phe Thr Ile Gly Thr Ala Leu Ile
5 10 15

Ser Leu Leu Ser Leu Pro Asn Val Ser Phe Ser Gly Ile Ile Asn
20 25 30

Asn Asn Ala Asn Asn Leu Gly Ile Tyr Ile Ser Gly Gln Tyr Lys
35 40 45

Pro Ser Val Ser Val Phe Ser Asn Phe Ser Val Lys Glu Thr Asn
50 55 60

Phe Thr Thr Gln Gln Leu Val Ala Leu Lys Lys Asp Ile Asp Ser
65 70 75

Val Asp Ile Ser Thr Asn Ala Asp Ser Gly Ile Asn Asn Pro Gln
80 85 90

Asn Phe Thr Ile Pro Tyr Ile Pro Lys Phe Gln Asp Asn Ala Ala
95 100 105

Ser Phe Ser Gly Ala Leu Gly Phe Phe Tyr Ala Arg Gly Leu Arg
110 115 120

Leu Glu Met Glu Gly Ser Tyr Glu Glu Phe Asp Val Lys Asn Pro
125 130 135

Gly Gly Tyr Thr Lys Val Lys Asp Ala Tyr Arg Tyr Phe Ala Leu
140 145 150

Ala Arg Glu Met Gln Ser Gly Gln Thr Cys Pro Lys His Lys Glu
155 160 165

Thr Ser Gly Ile Gln Pro His Gly Ile Tyr His Thr Val Met Arg
170 175 180

Asn Asp Gly Val Ser Ile Ser Ser Val Ile Ile Asn Gly Cys Tyr
185 190 195

Asn Phe Thr Leu Ser Asn Leu Pro Ile Ser Pro Tyr Met Cys Val
200 205 210

Gly Met Gly Ile Asp Ala Ile Gln Phe Phe Asp Ser Leu His Ile
215 220 225

Lys Phe Ala His Gln Ser Lys Leu Gly Ile Thr Tyr Pro Leu Ser
230 235 240

Ser Asn Val His Leu Phe Ala Asp Ser Tyr Tyr His Lys Val Ile
245 250 255

Gly Asn Lys Phe Lys Asn Leu Arg Val Gln His Val Tyr Glu Leu
260 265 270

Gln Gln Val Pro Lys Val Thr Ser Ala Val Ala Thr Leu Asp Ile
275 280 285

Gly Tyr Phe Gly Gly Glu Val Gly Val Arg Phe Ile Leu
290 295

<210> 12

<211> 300

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-12 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 12

Met Lys Lys Lys Asn Gln Phe Ile Thr Ile Ser Thr Ile Leu Val
5 10 15

Cys Leu Leu Ser Leu Ser Asn Ala Ser Leu Ser Asn Thr Thr Asn
20 25 30

Ser Ser Thr Lys Lys Gln Phe Gly Leu Tyr Val Ser Gly Gln Tyr
35 40 45

Lys Pro Ser Val Ser Ile Phe Ser Asn Phe Ser Val Lys Glu Thr
50 55 60

Asn Phe Pro Thr Lys Tyr Leu Ala Ala Leu Lys Lys Asp Ile Asn
65 70 75

Ser Val Glu Phe Asp Asp Ser Val Thr Ala Gly Ile Ser Tyr Pro
80 85 90

Leu Asn Phe Ser Thr Pro Tyr Ile Ala Val Phe Gln Asp Asn Ile
95 100 105

Ser Asn Phe Asn Gly Ala Ile Gly Tyr Thr Phe Val Glu Gly Pro
110 115 120

Arg Ile Glu Ile Glu Gly Ser Tyr Glu Glu Phe Asp Val Lys Asp
125 130 135

Pro Gly Arg Tyr Thr Glu Ile Gln Asp Ala Tyr Arg Tyr Phe Ala
140 145 150

Leu Ala Arg Asp Ile Asp Ser Ile Pro Thr Ser Pro Lys Asn Arg
155 160 165

Thr Ser His Asp Gly Asn Ser Ser Tyr Lys Val Tyr His Thr Val
170 175 180

Met Lys Asn Glu Gly Leu Ser Ile Ile Ser Ile Met Val Asn Gly
185 190 195

Cys Tyr Asp Phe Ser Ser Asp Asn Leu Ser Ile Leu Pro Tyr Val
200 205 210

Cys Gly Gly Ile Gly Val Asn Ala Ile Glu Phe Phe Asp Ala Leu
215 220 225

His Val Lys Phe Ala Cys Gln Gly Lys Leu Gly Ile Thr Tyr Pro
230 235 240

Leu Ser Ser Asn Val Ser Leu Phe Ala Gly Gly Tyr Tyr His Gln
245 250 255

Val Met Gly Asn Gln Phe Lys Asn Leu Asn Val Gln His Val Ala
260 265 270

Glu Leu Asn Asp Ala Pro Lys Val Thr Ser Ala Val Ala Thr Leu
275 280 285

Asp Ile Gly Tyr Phe Gly Gly Glu Ile Gly Ala Arg Leu Ile Phe
290 295 300

<210> 13

<211> 293

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-13 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 13

Met Asn Lys Lys Asn Lys Phe Phe Thr Ile Ser Thr Ala Met Val
5 10 15

Cys Leu Leu Leu Leu Pro Gly Ile Ser Phe Ser Glu Thr Ile Asn
20 25 30

Asn Ser Ala Lys Lys Gln Pro Gly Leu Tyr Ile Ser Gly Gln Tyr
35 40 45

Lys Pro Ser Val Ser Val Phe Ser Asn Phe Ser Val Lys Glu Thr
50 55 60

Asn Val Pro Thr Lys Gln Leu Ile Ala Leu Lys Lys Asp Ile Asn
65 70 75

Ser Val Ala Val Gly Ser Asn Ala Thr Thr Gly Ile Ser Asn Pro
80 85 90

Gly Asn Phe Thr Ile Pro Tyr Thr Ala Glu Phe Gln Asn Val
95 100 105

Ala Asn Phe Asn Gly Ala Val Gly Tyr Ser Phe Pro Asp Ser Leu
110 115 120

Arg Ile Glu Ile Glu Gly Phe His Glu Lys Phe Asp Val Lys Asn
125 130 135

Pro Gly Gly Tyr Thr Gln Val Lys Asp Ala Tyr Arg Tyr Phe Ala
140 145 150

Leu Ala Arg Asp Leu Lys Asp Gly Phe Phe Glu Pro Lys Ala Glu
155 160 165

Asp Thr Gly Val Tyr His Thr Val Met Lys Asn Asp Gly Leu Ser
170 175 180

Ile Leu Ser Thr Met Val Asn Val Cys Tyr Asp Phe Ser Val Asp
185 190 195

Glu Leu Pro Val Leu Pro Tyr Ile Cys Ala Gly Met Gly Ile Asn
200 205 210

Ala Ile Glu Phe Phe Asp Ala Leu His Val Lys Phe Ala Tyr Gln
215 220 225

Gly Lys Leu Gly Ile Ser Tyr Gln Leu Phe Thr Lys Val Asn Leu
230 235 240

Phe Leu Asp Gly Tyr Tyr His Gln Val Ile Gly Asn Gln Phe Lys
245 250 255

Asn Leu Asn Val Asn His Val Tyr Thr Leu Lys Glu Ser Pro Lys
260 265 270

Val Thr Ser Ala Val Ala Thr Leu Asp Ile Ala Tyr Phe Gly Gly
275 280 285

Glu Val Gly Ile Arg Phe Thr Phe
290

<210> 14
<211> 283
<212> PRT
<213> *Ehrlichia chaffeensis*

<220>
<223> P28-14 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 14
Met Asn Tyr Lys Lys Ile Phe Val Ser Ser Ala Leu Ile Ser Leu
5 10 15
Met Ser Ile Leu Pro Tyr Gln Ser Phe Ala Asp Pro Val Thr Ser
20 25 30
Asn Asp Thr Gly Ile Asn Asp Ser Arg Glu Gly Phe Tyr Ile Ser
35 40 45
Val Lys Tyr Asn Pro Ser Ile Ser His Phe Arg Lys Phe Ser Ala
50 55 60
Glu Glu Ala Pro Ile Asn Gly Asn Thr Ser Ile Thr Lys Lys Val
65 70 75
Phe Gly Leu Lys Lys Asp Gly Asp Ile Ala Gln Ser Ala Asn Phe
80 85 90
Asn Arg Thr Asp Pro Ala Leu Glu Phe Gln Asn Asn Leu Ile Ser
95 100 105
Gly Phe Ser Gly Ser Ile Gly Tyr Ala Met Asp Gly Pro Arg Ile
110 115 120
Glu Leu Glu Ala Ala Tyr Gln Lys Phe Asp Ala Lys Asn Pro Asp
125 130 135
Asn Asn Asp Thr Asn Ser Gly Asp Tyr Tyr Lys Tyr Phe Gly Leu
140 145 150

Ser Arg Glu Asp Ala Ile Ala Asp Lys Lys Tyr Val Val Leu Lys
155 160 165

Asn Glu Gly Ile Thr Phe Met Ser Leu Met Val Asn Thr Cys Tyr
170 175 180

Asp Ile Thr Ala Glu Gly Val Pro Phe Ile Pro Tyr Ala Cys Ala
185 190 195

Gly Val Gly Ala Asp Leu Ile Asn Val Phe Lys Asp Phe Asn Leu
200 205 210

Lys Phe Ser Tyr Gln Gly Lys Ile Gly Ile Ser Tyr Pro Ile Thr
215 220 225

Pro Glu Val Ser Ala Phe Ile Gly Gly Tyr Tyr His Gly Val Ile
230 235 240

Gly Asn Asn Phe Asn Lys Ile Pro Val Ile Thr Pro Val Val Leu
245 250 255

Glu Gly Ala Pro Gln Thr Thr Ser Ala Leu Val Thr Ile Asp Thr
260 265 270

Gly Tyr Phe Gly Gly Glu Val Gly Val Arg Phe Thr Phe
275 280

<210> 15

<211> 280

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-15 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 15

Met Asn Cys Lys Lys Phe Phe Ile Thr Thr Ala Leu Ala Leu Pro
5 10 15

Met Ser Phe Leu Pro Gly Ile Leu Leu Ser Glu Pro Val Gln Asp
20 25 30

Asp Ser Val Ser Gly Asn Phe Tyr Ile Ser Gly Lys Tyr Met Pro
35 40 45

Ser Ala Ser His Phe Gly Val Phe Ser Ala Lys Glu Glu Lys Asn
50 55 60

Pro Thr Val Ala Leu Tyr Gly Leu Lys Gln Asp Trp Asn Gly Val
65 70 75

Ser Ala Ser Ser His Ala Asp Ala Asp Phe Asn Asn Lys Gly Tyr
80 85 90

Ser Phe Lys Tyr Glu Asn Asn Pro Phe Leu Gly Phe Ala Gly Ala
95 100 105

Ile Gly Tyr Ser Met Gly Gly Pro Arg Ile Glu Phe Glu Val Ser
110 115 120

Tyr Glu Thr Phe Asp Val Lys Asn Gln Gly Gly Asn Tyr Lys Asn
125 130 135

Asp Ala His Arg Tyr Cys Ala Leu Asp Arg Lys Ala Ser Ser Thr
140 145 150

Asn Ala Thr Ala Ser His Tyr Val Leu Leu Lys Asn Glu Gly Leu
155 160 165

Leu Asp Ile Ser Leu Met Leu Asn Ala Cys Tyr Asp Val Val Ser
170 175 180

Glu Gly Ile Pro Phe Ser Pro Tyr Ile Cys Ala Gly Val Gly Thr
185 190 195

Asp Leu Ile Ser Met Phe Glu Ala Ile Asn Pro Lys Ile Ser Tyr
200 205 210

Gln Gly Lys Leu Gly Leu Ser Tyr Ser Ile Asn Pro Glu Ala Ser
215 220 225

Val Phe Val Gly Gly His Phe His Lys Val Ala Gly Asn Glu Phe
230 235 240

Arg Asp Ile Ser Thr Leu Lys Ala Phe Ala Thr Pro Ser Ser Ala
245 250 255

Ala Thr Pro Asp Leu Ala Thr Val Thr Leu Ser Val Cys His Phe
260 265 270

Gly Val Glu Leu Gly Gly Arg Phe Asn Phe
275 280

<210> 16

<211> 286

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-16 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 16

Met Asn Cys Glu Lys Phe Phe Ile Thr Thr Ala Leu Thr Leu Leu
5 10 15

Met Ser Phe Leu Pro Gly Ile Ser Leu Ser Asp Pro Val Gln Asp
20 25 30

Asp Asn Ile Ser Gly Asn Phe Tyr Ile Ser Gly Lys Tyr Met Pro
35 40 45

Ser Ala Ser His Phe Gly Val Phe Ser Ala Lys Glu Glu Arg Asn
50 55 60

Thr Thr Val Gly Val Phe Gly Ile Glu Gln Asp Trp Asp Arg Cys
65 70 75

Val Ile Ser Arg Thr Thr Leu Ser Asp Ile Phe Thr Val Pro Asn
80 85 90

Tyr Ser Phe Lys Tyr Glu Asn Asn Leu Phe Ser Gly Phe Ala Gly
95 100 105

Ala Ile Gly Tyr Ser Met Asp Gly Pro Arg Ile Glu Leu Glu Val
110 115 120

Ser Tyr Glu Ala Phe Asp Val Lys Asn Gln Gly Asn Asn Tyr Lys
125 130 135

Asn Glu Ala His Arg Tyr Tyr Ala Leu Ser His Leu Leu Gly Thr
140 145 150

Glu Thr Gln Ile Asp Gly Ala Gly Ser Ala Ser Val Phe Leu Ile
155 160 165

Asn Glu Gly Leu Leu Asp Lys Ser Phe Met Leu Asn Ala Cys Tyr
170 175 180

Asp Val Ile Ser Glu Gly Ile Pro Phe Ser Pro Tyr Ile Cys Ala
185 190 195

Gly Ile Gly Ile Asp Leu Val Ser Met Phe Glu Ala Ile Asn Pro
200 205 210

Lys Ile Ser Tyr Gln Gly Lys Leu Gly Leu Ser Tyr Pro Ile Ser
215 220 225

Pro Glu Ala Ser Val Phe Ile Gly Gly His Phe His Lys Val Ile
230 235 240

Gly Asn Glu Phe Arg Asp Ile Pro Thr Met Ile Pro Ser Glu Ser
245 250 255

Ala Leu Ala Gly Lys Gly Asn Tyr Pro Ala Ile Val Thr Leu Asp
260 265 270

Val Phe Tyr Phe Gly Ile Glu Leu Gly Gly Arg Phe Asn Phe Gln
275 280 285

Leu

<210> 17
<211> 278

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-17 Outer Membrane Protein of
Ehrlichia chaffeensis

<400>	17		
Met Asn Cys Lys Lys Phe Phe Ile Thr Thr Ala Leu Val Ser Leu	5	10	15
Met Ser Phe Leu Pro Gly Ile Ser Phe Ser Asp Pro Val Gln Gly	20	25	30
Asp Asn Ile Ser Gly Asn Phe Tyr Val Ser Gly Lys Tyr Met Pro	35	40	45
Ser Ala Ser His Phe Gly Met Phe Ser Ala Lys Glu Glu Lys Asn	50	55	60
Pro Thr Val Ala Leu Tyr Gly Leu Lys Gln Asp Trp Glu Gly Ile	65	70	75
Ser Ser Ser Ser His Asn Asp Asn His Phe Asn Asn Lys Gly Tyr	80	85	90
Ser Phe Lys Tyr Glu Asn Asn Pro Phe Leu Gly Phe Ala Gly Ala	95	100	105
Ile Gly Tyr Ser Met Gly Gly Pro Arg Val Glu Phe Glu Val Ser	110	115	120
Tyr Glu Thr Phe Asp Val Lys Asn Gln Gly Asn Asn Tyr Lys Asn	125	130	135
Asp Ala His Arg Tyr Cys Ala Leu Gly Gln Gln Asp Asn Ser Gly	140	145	150
Ile Pro Lys Thr Ser Lys Tyr Val Leu Leu Lys Ser Glu Gly Leu	155	160	165
Leu Asp Ile Ser Phe Met Leu Asn Ala Cys Tyr Asp Ile Ile Asn	170	175	180

Glu Ser Ile Pro Leu Ser Pro Tyr Ile Cys Ala Gly Val Gly Thr
185 190 195

Asp Leu Ile Ser Met Phe Glu Ala Thr Asn Pro Lys Ile Ser Tyr
200 205 210

Gln Gly Lys Leu Gly Leu Ser Tyr Ser Ile Asn Pro Glu Ala Ser
215 220 225

Val Phe Ile Gly Gly His Phe His Lys Val Ile Gly Asn Glu Phe
230 235 240

Arg Asp Ile Pro Thr Leu Lys Ala Phe Val Thr Ser Ser Ala Thr
245 250 255

Pro Asp Leu Ala Ile Val Thr Leu Ser Val Cys His Phe Gly Ile
260 265 270

Glu Leu Gly Gly Arg Phe Asn Phe
275

<210> 18

<211> 280

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-18 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 18

Met Asn Cys Lys Lys Phe Phe Ile Thr Thr Thr Leu Val Ser Leu
5 10 15

Met Ser Phe Leu Pro Gly Ile Ser Phe Ser Asp Ala Val Gln Asn
20 25 30

Asp Asn Val Gly Gly Asn Phe Tyr Ile Ser Gly Lys Tyr Val Pro
35 40 45

Ser Val Ser His Phe Gly Val Phe Ser Ala Lys Gln Glu Arg Asn
50 55 60

Thr Thr Ile Gly Val Phe Gly Leu Lys Gln Asp Trp Asp Gly Ser
65 70 75

Thr Ile Ser Lys Asn Ser Pro Glu Asn Thr Phe Asn Val Pro Asn
80 85 90

Tyr Ser Phe Lys Tyr Glu Asn Asn Pro Phe Leu Gly Phe Ala Gly
95 100 105

Ala Val Gly Tyr Leu Met Asn Gly Pro Arg Ile Glu Leu Glu Met
110 115 120

Ser Tyr Glu Thr Phe Asp Val Lys Asn Gln Gly Asn Asn Tyr Lys
125 130 135

Asn Asp Ala His Lys Tyr Tyr Ala Leu Thr His Asn Ser Gly Gly
140 145 150

Lys Leu Ser Asn Ala Gly Asp Lys Phe Val Phe Leu Lys Asn Glu
155 160 165

Gly Leu Leu Asp Ile Ser Leu Met Leu Asn Ala Cys Tyr Asp Val
170 175 180

Ile Ser Glu Gly Ile Pro Phe Ser Pro Tyr Ile Cys Ala Gly Val
185 190 195

Gly Thr Asp Leu Ile Ser Met Phe Glu Ala Ile Asn Pro Lys Ile
200 205 210

Ser Tyr Gln Gly Lys Leu Gly Leu Ser Tyr Ser Ile Ser Pro Glu
215 220 225

Ala Ser Val Phe Val Gly Gly His Phe His Lys Val Ile Gly Asn
230 235 240

Glu Phe Arg Asp Ile Pro Ala Met Ile Pro Ser Thr Ser Thr Leu
245 250 255

Thr Gly Asn His Phe Thr Ile Val Thr Leu Ser Val Cys His Phe
260 265 270

Gly Val Glu Leu Gly Gly Arg Phe Asn Phe
275 280

<210> 19

<211> 281

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-19 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 19

Met Asn Tyr Lys Lys Val Phe Ile Thr Ser Ala Leu Ile Ser Leu
5 10 15

Ile Ser Ser Leu Pro Gly Val Ser Phe Ser Asp Pro Ala Gly Ser
20 25 30

Gly Ile Asn Gly Asn Phe Tyr Ile Ser Gly Lys Tyr Met Pro Ser
35 40 45

Ala Ser His Phe Gly Val Phe Ser Ala Lys Glu Glu Arg Asn Thr
50 55 60

Thr Val Gly Val Phe Gly Leu Lys Gln Asn Trp Asp Gly Ser Ala
65 70 75

Ile Ser Asn Ser Ser Pro Asn Asp Val Phe Thr Val Ser Asn Tyr
80 85 90

Ser Phe Lys Tyr Glu Asn Asn Pro Phe Leu Gly Phe Ala Gly Ala
95 100 105

Ile Gly Tyr Ser Met Asp Gly Pro Arg Ile Glu Leu Glu Val Ser
110 115 120

Tyr Glu Thr Phe Asp Val Lys Asn Gln Gly Asn Asn Tyr Lys Asn
125 130 135

Glu Ala His Arg Tyr Cys Ala Leu Ser His Asn Ser Ala Ala Asp
140 145 150

Met Ser Ser Ala Ser Asn Asn Phe Val Phe Leu Lys Asn Glu Gly
155 160 165

Leu Leu Asp Ile Ser Phe Met Leu Asn Ala Cys Tyr Asp Val Val
170 175 180

Gly Glu Gly Ile Pro Phe Ser Pro Tyr Ile Cys Ala Gly Ile Gly
185 190 195

Thr Asp Leu Val Ser Met Phe Glu Ala Thr Asn Pro Lys Ile Ser
200 205 210

Tyr Gln Gly Lys Leu Gly Leu Ser Tyr Ser Ile Ser Pro Glu Ala
215 220 225

Ser Val Phe Ile Gly Gly His Phe His Lys Val Ile Gly Asn Glu
230 235 240

Phe Arg Asp Ile Pro Thr Ile Ile Pro Thr Gly Ser Thr Leu Ala
245 250 255

Gly Lys Gly Asn Tyr Pro Ala Ile Val Ile Leu Asp Val Cys His
260 265 270

Phe Gly Ile Glu Leu Gly Gly Arg Phe Ala Phe
275 280

<210> 20

<211> 271

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-20 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 20
Met Asn Tyr Lys Lys Phe Val Val Gly Val Ala Leu Ala Thr Leu
5 10 15

Leu Ser Phe Leu Pro Asp Asn Ser Phe Ser Asp Ala Asn Val Pro
20 25 30

Glu Gly Arg Lys Gly Phe Tyr Val Gly Thr Gln Tyr Lys Val Gly
35 40 45

Val Pro Asn Phe Ser Asn Phe Ser Ala Glu Glu Thr Leu Pro Gly
50 55 60

Leu Thr Lys Ser Ile Phe Ala Leu Gly Leu Asp Lys Ser Ser Ile
65 70 75

Ser Asp His Ala Gly Phe Thr Gln Ala Tyr Asn Pro Thr Tyr Ala
80 85 90

Ser Asn Phe Ala Gly Phe Gly Gly Val Ile Gly Tyr Tyr Val Asn
95 100 105

Asp Phe Arg Val Glu Phe Glu Gly Ala Tyr Glu Asn Phe Glu Pro
110 115 120

Glu Arg Gln Trp Tyr Pro Glu Gly Gly Glu Ser His Lys Phe Phe
125 130 135

Ala Leu Ser Arg Glu Ser Thr Val Gln Asp Asn Lys Phe Ile Val
140 145 150

Leu Glu Asn Asp Gly Val Ile Asp Lys Ser Leu Asn Val Asn Phe
155 160 165

Cys Tyr Asp Ile Ala His Gly Ser Ile Pro Leu Ala Pro Tyr Met
170 175 180

Cys Ala Gly Val Gly Ala Asp Tyr Ile Lys Phe Leu Gly Ile Ser
185 190 195

Leu Pro Lys Phe Ser Tyr Gln Val Lys Phe Gly Val Asn Tyr Pro
200 205 210

Val Ser Val Asn Val Met Leu Phe Gly Gly Gly Tyr Tyr His Lys
215 220 225

Val Ile Gly Asn Arg Tyr Glu Arg Val Glu Ile Ala Tyr His Pro
230 235 240

Ala Thr Leu Thr Asn Val Pro Lys Thr Thr Ser Ala Ser Ala Thr
245 250 255

Leu Asp Thr Asp Tyr Phe Gly Trp Glu Val Gly Met Arg Phe Thr
260 265 270

Leu

<210> 21

<211> 279

<212> PRT

<213> *Ehrlichia chaffeensis*

<220>

<223> P28-21 Outer Membrane Protein of
Ehrlichia chaffeensis

<400> 21

Met Arg Tyr Lys Asp Phe Ser Asn Asn Ile Asp Val Ile Ile Gly
5 10 15

Thr Leu Val Gly Cys Phe Ser Gly Ser Leu Asp Val Ser Asp Ser
20 25 30

Leu Asn Ser Arg Leu Lys Pro Val Phe Leu Gly Ile Ser Tyr Lys
35 40 45

Leu Ser Ala Pro Leu Phe Ser Ser Phe Ser Ile Gly Glu Thr Tyr
50 55 60

Arg Ile Asn Gly Val Lys Thr Asp Arg Val Val Gly Leu Lys Ser
65 70 75

Asp Ile Leu Leu Asp Ala Asp Lys Ala Met Lys Asp Phe Asn Asn
80 85 90

Phe Asn Phe Ser Glu Glu Tyr Val Pro Lys Tyr Asp Asn Asn Ile
95 100 105

Phe Gly Leu Ser Phe Ile Phe Gly Tyr Ser Phe Arg Asn Leu Arg
110 115 120

Val Glu Leu Glu Gly Ser Tyr Lys Lys Phe Asp Val Ile Asp Thr
125 130 135

Arg Asn His Leu Val Asp Asn Asn Tyr Arg His Ile Ala Leu Val
140 145 150

Arg Ser Asn Pro Pro Thr Leu Tyr Asp Tyr Phe Val Leu Lys Asn
155 160 165

Asp Gly Val Glu Phe Tyr Ser Thr Ile Leu Asn Ile Cys Tyr Asp
170 175 180

Phe Ala Val Asp Thr Asn Ile Val Pro Phe Ser Cys Val Gly Ile
185 190 195

Gly Glu Asp Ile Ile Lys Ile Phe Asp Ser Ile Arg Phe Lys Pro
200 205 210

Ser Phe Asn Ser Lys Leu Gly Ile Asn Tyr Leu Met Ser Gln Asp
215 220 225

Met Leu Leu Phe Phe Asp Val Tyr Tyr His Arg Val Val Gly Asn
230 235 240

Glu Tyr Asn Asn Ile Pro Val Gln Tyr Val Ser Leu Pro Asn Pro
245 250 255

Leu Asn Ile Ser Thr Ala Ala Lys Leu Asp Met Glu Tyr Phe Gly
260 265 270

Ala Glu Ile Gly Ile Lys Val Phe Val
275

<210> 22
<211> 23
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-10 forward primer
<400> 22

acgtgatatg gaaagcaaca agt 23

<210> 23
<211> 18
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-10 reverse primer
<400> 23

gcgccgaaat atccaaaca 18

<210> 24
<211> 22
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-11 forward primer
<400> 24

ggtaaaactt gccctaaaca ca 22

<210> 25
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-11 reverse primer
<400> 25

acttcaccac caaaaatccca aata 24

<210> 26
<211> 19
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-12 forward primer
<400> 26

ctgctggcat tagttaccc 19

<210> 27
<211> 17
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-12 reverse primer
<400> 27

catagcagcc attgacc 17

<210> 28
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-13 forward primer
<400> 28

attgattgcc tattacttga tggt 24

<210> 29
<211> 20
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-13 reverse primer
<400> 29

aatggggctg ttggttactc 20

<210> 30
<211> 23
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-14 forward primer
<400> 30

tgaagacgca atagcagata aga 23

<210> 31
<211> 20
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-14 reverse primer
<400> 31

tagcgcagat gtggttttag 20

<210> 32
<211> 21
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-15 forward primer
<400> 32

actgtcgctg tgtatggttt g 21

<210> 33
<211> 22
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-15 reverse primer
<400> 33

attagtgctg cttgctttac ga 22

<210> 34
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-17 forward primer
<400> 34

tgcaaggta caatattagt ggta 24

<210> 35
<211> 22
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-17 reverse primer
<400> 35

gtattccgct gttgtcttgt tg 22

<210> 36
<211> 21
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-18 forward primer
<400> 36

acattttggc gtattctctg c 21

<210> 37
<211> 21
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-18 reverse primer
<400> 37

tagcttccc ccactgttat g 21

<210> 38
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-20 forward primer
<400> 38

aacttatggc tttctcctcc tttc 24

<210> 39
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-20 reverse primer
<400> 39

ttgcctgata attcttttc tgat 24

<210> 40
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-21 forward primer

<400> 40
accaacttcc caacccaaat aatc 24

<210> 41
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> P28-21 reverse primer
<400> 41

ctgaaggagg agaaagccat aagt 24

<210> 42
<211> 23
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 1a-r1 primer
<400> 42

accaaagtat gcaatgtcaa gtg 23

<210> 43
<211> 25
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 1a-r2 primer
<400> 43

ctgcagatgt gacttttagga gattc 25

<210> 44
<211> 23
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28r3 primer
<400> 44

tgtatatatctt ccagggtctt tga 23

<210> 45
<211> 18
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> pvur32 primer
<400> 45

gaccattcta cctcaacc 18

<210> 46
<211> 22
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28r10 primer
<400> 46

atatccaatt gctccactga aa 22

<210> 47
<211> 30
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28r12 primer
<400> 47

cttgaaatgt aacagtatat ggaccttcaa 30

<210> 48
<211> 20
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28stur primer
<400> 48

tgtcctttt aagcccaact 20

<210> 49
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28r14 primer
<400> 49

ttctgcagat tcatgtggat gttt 24

<210> 50
<211> 21
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28r15 primer
<400> 50

tgcagattga tgtggatgtt t 21

<210> 51
<211> 22
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28f1 primer
<400> 51

gtaaaaacaca agccaccagt ct 22

<210> 52
<211> 24
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28f2 primer
<400> 52

gggcatatac ctacacccaaa cacc 24

<210> 53
<211> 21
<212> DNA
<213> artificial sequence
<220>
<221> primer_bind
<223> 28f3 primer
<400> 53

taagaggatt ggtaaggat a 21